VISION OF THE INSTITUTE

Vision:

To empower the students through Academic excellence and Ethics so as to bring about social transformation and prosperity.

MISSION OF THE INSTITUTE

Mission:

- To expand the frontiers of knowledge through quality education.
- To provide value added Research and development.
- To embody a spirit of excellence in Teaching, Creativity, Entrepreneurship and Outreach.
- To provide a platform for synergy of Academy, Industry and Community.
- To inculcate high standards of Ethical and Professional behavior.

VISION OF EEE DEPARTMENT

Vision:

To be recognized as a Centre of Excellence in the field of Education and Research so as to produce competent & Ethical Engineers capable enough to contribute to the society.

MISSION OF EEE DEPARTMENT

Mission:

- To develop innovative, efficient and proficient electrical engineers.
- To keep the curriculum industry friendly, with due regard to the University curriculum.
- To be a place for innovative blended learning and entrepreneurship development in multidisciplinary areas.
- To promote ethical and moral values among the students so as to make them emerge as responsible professionals.

EEE DEPT PROGRAM EDUCATIONAL OBJECTIVES (PEO's)

PEO1: To produce Electrical and Electronics Engineering graduates who have strong foundation in Mathematics, Sciences and Basic Engineering

PEO2: To provide intensive training in problem solving, laboratory skills and design skills to use modern engineering tools through higher education and research.

PEO3: Ability to pursue higher studies and to seek employment in a variety of engineering technology positions and work successfully in their chosen career aspirations and generate entrepreneurs.

PEO4: To inculcate in students professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach, and an ability to relate engineering issues to broader social context through life-long learning.

PROGRAM OUTCOMES (POs) OF EEE DEPARTMENT

Program Outcomes are the statements that describe what learners will know and be able to do when they graduate from a program.

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11.Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12.Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES(PSO'S) OF EEE DEPARTMENT

PSO 1: The EEE program must demonstrate knowledge and hands-on competence in the application of electrical and electronics circuits in a rigorous mathematical environment at or above the level of algebra and trigonometry.

PSO 2: The EEE program must demonstrate that graduates can apply interdisciplinary project management techniques to electrical and electronics systems.

PSO 3: The EEE program must demonstrate that graduates can analyze, design and develop hardware and software for control systems, measurements, power electronics and power systems

Year/Semester	III B. Tech/II Sem	L	T	P	C
Regulation Year	2019-20	2	1	0	3
Subject	ELECTRICAL MACHINES - III				
Branch	EEE				

Course Objectives:

- To understand the concept ofdouble revolving field theory and applications of a.c series motor.
- To understandthe armature winding designs and armature reaction concepts of synchronous generator
- To understand the concept of regulation and parallel operation of alternators
- To understand the operation and performance of synchronous motor.
- To understand the V and inverted V curves of synchronous motor.
- To understand the construction and operation of SRM and PMBLDC Motor.

UNIT- I:

Single phase motors:

Constructional features of single phase induction motors – problem of starting–double revolving field theory – classification of single phase induction motor – equivalent circuit of single phase induction motor – AC series motor.

UNIT–II:

Synchronous generator:

Constructional features of non-salient and salient pole rotor – Armature windings –distributed and concentrated windings–emf equation–armature reaction– two reaction analysis of salient pole machines – Numerical problems.

UNIT–III:

Voltage regulation &parallel operation:

Voltage regulation by synchronous impedance, MMF and Potier triangle methods– phasor diagrams – synchronization and parallel operation of alternators – load sharing – numerical problems.

UNIT – IV:

Synchronous motor and starting methods:

Principle of operation– phasordiagram –starting methods – damper winding, pony motor,staring as slip ring induction motor –expression for power developed and synchronizing torque.

UNIT – V:

Synchronous motor performance characteristics:

Excitation and power circles –variation of current and power factor with excitation (V& Inverted V-curves) – hunting and its suppression – synchronous condenser.

UNIT – VI:

Switched reluctance motor

Construction and principle of operation of switched reluctance motor – torque expression – different converter configurations for SRM – applications.

Permanent magnet brushless DC motor

Construction and principle of operation of PMBLDC motor –characteristics of square wave &sine wave PMBLDC motor – applications.

Course Outcomes:

At the end of this course the students are

- Able to analyze the performance of single phase induction and ac series motors.
- Able to analyze the armature winding design and armature reaction concept in synchronous generator
- Able to analyze various voltage regulation methods of alternators
- Able to explain various starting methods and analyze the performance of synchronous motor
- Able to explain the hunting phenomenon of synchronous motor and V& Inverted V-curves.
- Able to explain the construction and operation of SRM and PMBLDCmotor.

TEXT BOOKS

3. The Performance and Design of Alternating Current Machines by M. G. Say, CBS Publishers, 3rd Edition, 2002.
4. Special Electrical Machines by K.VenkataRatnam, University press, 2019, New Delhi.

REFERENCE BOOKS

5. Electrical Machines by P. S. Bimbhra, Khanna Publishers, 8th edition, 2020.
6. Electrical Machines by D. P.Kothari, I. J. Nagarth, McGraw Hill Publications, 5th edition, 2017.
7. Theory & Performance of Electrical Machines by J B Gupta, S.K. Kataria& Sons, 2013 edition.
8. Special Electrical Machines by E.G. Janardhanan, PHI learning private limited, 2014.

Year/Semester	III B. Tech/ II Sem	L	T	P	C
Regulation Year	2019-20	2	1	0	3
Subject	POWER SYSTEM ANALYSIS				
Branch	EEE				

Course Objectives:

- To understand the per unit concept and representation system in per unit reactance diagram and Y bus matrix
- To study the different load flowmethods.
- To develop Z bus Matrix using the concept of Z bus building algorithm
- To study short circuit calculation for symmetricalfaults
- To analyze the effect of unsymmetrical faults on power system
- To provide the basic concepts of power system stability issues.

UNIT –I

Per Unit Representation &Y-Bus formulation

Per unit quantities, representation of a power system -Single line diagram, Impedance diagram and per unit reactance diagram, formation of element node incidence and Bus incidence matrices – Primitive network representation – Formation of Y–bus matrix by using singular transformation and direct inspectionmethods.

UNIT –II

Power Flow Studies

Necessity of power flow studies – Bus classification-Derivation of static power flow equations – Power flow solution in polar coordinates using Gauss-Seidel Method – Newton Raphson Method– Decoupled and Fast Decoupled methods, Numerical Problems (3–bus system only).

UNIT –III

Z–Bus formulation

Concept ofpartial network, formation of Z–Bus matrix(without mutual Inductance effect) using Z-Bus building algorithm- Derivation of different cases-Addition of an element from a new bus to reference– Addition of an element from a new bus to an old bus– Addition of an element between an old bus to reference and Addition of element between two old busses –Numerical Problems

UNIT – IV

Symmetrical Fault Analysis

Classification of power systems faults -Importance of short circuit analysis-assumptions made in fault analysis, Symmetrical fault analysis- Behavior of unloadedshort circuited synchronous machine, three Phase short circuit currents and reactance's.Short circuit MVA and current calculations-Types of Series reactors and its applications, numerical problems.

UNIT –V

Unsymmetrical Fault Analysis

Symmetrical component theory-Symmetrical components and transformation-Sequence Impedances-Sequence Networks of synchronous machine, transformers and transmission lines. Unsymmetrical fault analysis-LG, LL, LLG and LLL faults on unloaded alternator, numerical problems.

UNIT – VI

Power System Stability Analysis

Classification of power system stability, Description of steady state stability power limit, transfer reactance, synchronizing power coefficient, Power angle curve and determination of steady state stability, methods to improve steady state stability. Swing equation and its importance. Equal Area Criterion-Determination of transient stability, application of Equal Area Criterion, critical clearing angle calculations.

`Course Outcomes:

- Able to develop per unit reactance diagram and Y bus matrix of power system network.
- Able to solvethe load flow problems of power system network by using differentload flow solution techniques.
- Able to formthe Z busmatrix of power systemnetworks.
- Able to identify the different faults on power system and find the symmetrical fault currents to provide data for the design of protectivedevices.
- Able to develop sequence networks for different type's unsymmetrical faults and provide necessary data for the design of protection devices.
- Able to analyze the steady state, transient and dynamic stability concepts of a power system.

Text Books:

1. Power System Analysis - by Grainger and Stevenson, Tata McGraw Hill, Publication Year – 2017
2. Modern Power system Analysis – by I.J.Nagrath &D.P.Kothari: TataMcGraw–Hill Publishing Company, Edition - IV, 2011.

Reference Books:

1. Power System Analysis – by A.R.Bergen and Vijay Vittal, Prentice Hall, Inc, Pearson Education. India, Edition - II, 2013.
2. Power System Analysis - by Hadi Saadat – TMH Edition, PSA Publications, Edition -III, 2020.
3. Electrical Power Systems – by C.L.Wadhwa, New Age International (P) Limited, Publishers, Edition - VI, 2018
4. Power System Analysis and Design - by J.Duncan Glover, M.S.Sarma, T.J.Overbye Cengage Learning India Pvt. Ltd., Edition - VI, 2019.
5. Power System Analysis and Design – by B.R.Gupta, A H Wheeler Publishing Company Limited, Edition - III, 2005.

Course Name	Microprocessor and Microcontrollers				
Year/Semester	III B.Tech/IISem EEE	L	T	P	C
Regulation Year	2019-2020	3	0	0	3

Course Objectives:

1. To develop an in-depth understanding of the operation of microprocessors.
2. To master the assembly language programming using concepts like assembler directives, procedures, macros, software interrupts etc.
3. To create an exposure to basic peripherals, its programming and interfacing techniques
4. To understand the concept of Interrupts and interfacing details of 8086.
5. To impart the basic concepts of serial communication in 8086.
6. To develop an in-depth understanding of the operation of microcontroller.
7. To understand the features of 8051 Microcontroller, its instruction set and also other controllers.

UNIT-I

8086 architecture: 8086 architecture- functional diagram, Register organization, memory segmentation, programming model, Memory addresses, physical memory organization, Signal descriptions of 8086-common function signals, timing diagrams.

UNIT-II

Programming with 8086 Microprocessor: Instruction formats. Addressing modes, instruction set, assembler directives. Macros, Simple programs involving logical, branch and call instructions.Sorting, evaluating arithmetic expressions, string manipulations.

UNIT-IV

Interrupts and Memory Interfacing : Memory interfacing to 8086, Interrupts of 8086, Vector interrupt table, Interrupt service routine, Serial communication standards, serial data transfer schemes, 8251 USART architecture and Interfacing.

UNIT-III

I/O Interface: 8255 PPI, various modes of operation and interfacing to 8086, interfacing of Stepper motor interfacing, D/A &A/D converter, key board, display. Intel 8259 programmable interrupt controller, Intel 8257 DMA controller, Intel 8253 Programmable Timer.

UNITV

8051 Micro controller: Architecture of 8051, Pin description, Special Function Registers (SFRs), Memory Organization, I/O Pins Ports and Circuits, Instruction set, Addressing modes, Assembly language programming**.**

UNITVI

Interfacing8051 Microcontroller: Programming 8051 Timers, Serial Port Programming, Interrupts Programming, LCD & Keyboard Interfacing, ADC, DAC & Sensor Interfacing, External Memory Interface, Stepper Motor and Waveform generation, Comparison of Microprocessor, Microcontroller, PIC and ARM processors

Text Books:

1.Advanced microprocessors and peripherals-A. K ray and K.M.Bhurchandani, TMH, 2nd edition 2006.

2. The 8051 Microcontroller & Embedded Systems Using Assembly and C by Kenneth J.Ayala, Dhananjay V.Gadre,CengageLearninbg , India Edition.

3Microprocessors and Interfacing – Programming and Hard ware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rd Edition.

References:

1. The Intel Microprocessors-Architecture, Programming, and Interfacing by Barry B.Brey, Pearson, Eighth Edition-2012.

2. Microprocessors and Microcontrollers-Architecture, Programming and System Design by Krishna Kant, PHI Learning Private Limited, Second Edition, 2014.

3. Microprocessors and Microcontrollers by N.Senthil Kumar, M.Saravanan and S.Jeevananthan, Oxford University Press, Seventh Impression 2013

OUTCOMES:

At the end of the course, the students should be able to:

- Understand and execute programs based on 8086microprocessor.
- Design Memory Interfacing circuits.
- Design and interface I/O circuits.
- Design and implement 8051 microcontroller based systems

Year/Semester	III B. Tech/ II Sem	L	T	P	C
Regulation Year	2019-20	2	1	0	3
Subject	DESIGN THINKING &PRODUCT INNOVATION				
Branch	EEE				

COURSE OBJECTIVES:

- To provide the basic concepts and techniques of engineering and reverse engineering, Process of design, analytical thinking and ideas, basics and development of engineering Drawing, application of engineering drawing with computer aide.
- To get exposure of exhibiting their creativity in terms of an innovative product development in a structured process through this course.

UNIT –I

INTRODUCTION TO PRODUCT DESIGN AND DEVELOPMENT PROCESS

Characteristics of successful product development, design and development products, the challenges of product development, a generic development process, concept development the front end process, product development process flows, product development organisation. Product developing process.

UNIT-II

IDEA AND CONCEPT GENERATION

Gather raw data from customer, interpret the raw data in terms of customer needs, organise the needs in to a hierarchy, establish the relative importance of the needs, reflects on the results and process, the activity of the concept generation, clarify the problem, search externally, search internally, explore systematically, reflect on the solutions and the process.

UNIT-III

TESTING AND PRODUCT ARCHITECTURE DEVELOPMENT

Define the purpose of the concept test, choose a survey format, measure the customer response, Product architecture, architecture implementation and establishment, industrial design, impact of industrial design, industrial design process, management of the ID, assessing the quality of ID.

UNIT-IV

DESIGN FOR MANUFACTURING AND PROTOTYPING

Define design for manufacturing, estimate the manufacturing cost, reduce the cost concepts, reduce the cost of the assembly, reduce the cost of the supporting production, and consider the impact of DFM, principles of prototyping, prototyping technologies, planning for prototypes.

UNIT-V

ROBUST DESIGN

Introduction to robust design, identify the control factor, noise factors, performance matrices, objective function, run the experiment and conduct the analysis, reflect and repeat.

UNIT VI

DESIGN THINKING FOR SERVICE DESIGN

Design thinking for service design: How to design a service, Principles of service design, Benefits of service design, Service blueprint, Design strategy, organization, principles for information design, principles of technology for service design.

COURSE OUTCOMES

Upon the successful completion of the course, students will be able to:

- Gather deep insights into design thinking and appreciate various design process procedures.
- Develop design ideas through different techniques and Analyse innovative product design.
- The knowledge gained through DFM and prototyping technologies can apply to make a prototype of models.
- Understand design techniques related to variety of software services.

TEXT BOOKS:

1. Karl T Ulrich, Steven D Eppinger and Anita Goyal, Product Design &Development, Tata McGraw Hill, 12th Edition, 2014.
2. Anthony Di Benedetto and Merle Crawford, New Products Management, Tata McGrawHill, 11th Edition, 2014.

REFERENCE BOOKS:

1. YousefHaik and Tamer M. Shahin,Engineering Design Process, Cengage Learning,2nd Edition, 2015.
2. Clayton Christensen,Innovators Dilemma, Harper Collins Publishers, Reprint Edition, 2013
3. John.R. Karsnitz, Stephen O'Brien and John P. Hutchinson,Engineering Design, Cengage learning, 2nd Edition, 2013.

HUMANITIES ELECTIVE-I					
Year/Semester	**III B. Tech/ II Sem**	**L**	**T**	**P**	**C**
Regulation Year	**2019-20**	**2**	**1**	**0**	**3**
Subject	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**				
Branch	**EEE**				

Course Objectives:

1. The objective of the course is to create awareness about different economic business and accounting issues**.**

UNIT	TOPICS
UNIT I	**Introduction to Managerial Economics and demand Analysis:** Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand-Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting.
UNIT II	**Production and Cost Analysis:** Concept of Production function- Cobb-Douglas Production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)Managerial significance and limitations of Breakeven point.
UNIT III	**Introduction to Markets & Pricing Policies:** Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination - Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.
UNIT IV	**Types of Business Organization and Business Cycles:** Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of a Business Cycle.
UNIT V	**Introduction to Accounting;** Double Entry Systems – Personal account, Real account, Nominal account GAAP-Preparation of final accounts –Trading account, Profit and Loss account, Balance sheet simple problems -Ratio Analysis .
UNIT VI	**Capital and Capital Budgeting :**Meaning of Capital- Capital Budgeting-Traditional Methods (pay back period, accounting rate of return) and modern methods(Discounted cash flow method, NetPresent Value method,Internal Rate of Return Method and Profitability Index)

REFERENCES:

1.Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya

PublishingHouse, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.
4. Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications.

Course Outcomes:

1. To adopt the Managerial Economic concepts for decision making and forward , planning.
2. To outline the different types of business organizations and provide a framework for analyzing money in its functions as a medium of exchange
3. To implement various techniques for assessing the financial position of the business.

HUMANITIES ELECTIVE-I					
Year/Semester	**III B. Tech/ II Sem**	**L**	**T**	**P**	**C**
Regulation Year	**2019-20**	**2**	**1**	**0**	**3**
Subject	**PROFESSIONAL ETHICS AND HUMAN VALUES**				
Branch	**EEE**				

Course Objectives:

1. To introduce the students to the ethical concepts that is relevant to resolving moral issues in engineering.
2. It presents the fundamentals of ethics, starting from the Indian ethos and goes to explain the various concepts of engineering ethics
3. Discusses the rights and responsibilities of engineers in an organizational setting

UNIT	TOPICS
UNIT I	**Human Values:** Morals, values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully- Caring – Sharing – Honesty – Courage – Value Time – Co-operation – Commitment – Empathy – Self Confidence – Spirituality – Character.
UNIT II	**Engineering Ethics:** The history of Ethics- Purposes for Engineering Ethics – Engineering Ethics – Consensus and controversy – Professional and Professionalism – Professional Roles to be played by an Engineer – Self Interest, Customs and Religion – Uses of Ethical Theories – Professional Ethics – Types of Inquiry – Engineering and Ethics – Kohlberg's Theory – Gilligan's Argument – Heinz's Dilemma.
UNIT III	**Engineering as Social Experimentation:** Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning From the past – Engineer as Managers, Consultants, and Leaders – Accountability – Role of codes – Codes and Experimental Nature of Engineering.
UNIT IV	**Engineer's Responsibility for Safety and Risk:** Safety and Risk, concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk – Short term v/s Long Term Consequences – Expected Probability – Reversible Effects – Threshold levels for Risk – Delayed v/s Immediate Risk – safety and the Engineer – Designing for Safety – Risk-Benefit Analysis- Accidents.
UNIT V	**Engineer's Responsibilities and Rights:** Collegiality – Techniques for achieving Collegiality – Two Senses of Loyalty- obligations of Loyalty – Misguided loyalty- Professionalism and Loyalty –Professional Rights- Professional Responsibilities – Confidential and proprietary information – Conflict of Interest – Solving conflict problems- Self interest, Customs and Religion — Collective Bargaining – Confidentiality – Acceptance of Bribes/ Gifts – when is a Gift and a Bribe –problem solving– Whistle Blowing – types of whistle blowing- when should it be attempted.
UNIT VI	**Global Issues:** Globalization – Cross culture Issues- Environmental Ethics- Computer Ethics – Computers as the instrument of Unethical behavior- computers as the object of Unethical acts – autonomous computer codes of Ethics – Ethics and Research – Analyzing Ethical Problems in Research.

REFERENCES:

1.T1:Professional ethics & human values by M.Govindarajan,S.Nataran&V.S.Senthilkumar
2. T2:M.P.raghavan's professional ethics and human values
3.T3:Professional ethics and morals-A.R.Aryasri

Course Outcomes:

Upon completion of this course, students should have

1. Understood the core values that shape the ethical behaviour of an engineer.
2. Exposed awareness on professional ethics and human values.
3. Known their role in technological development.

HUMANITIES ELECTIVE-I					
Year/Semester	**III B. Tech/ II Sem**	**L**	**T**	**P**	**C**
Regulation Year	**2019-20**	**2**	**1**	**0**	**3**
Subject	**BUSINESS ENVIRONMENT**				
Branch	**EEE**				

Course Objectives: Student should be able to outline how an entity operates in a business environment.

UNIT	TOPICS
UNIT I	**Business Environment:** Importance at national and international level – problems and challenges– factors both internal and external influencing business environment, Industrial policies since independence and their significance .
UNIT II	**Structure of Indian economy:** Nature and significance – Economic systems – structure of Indian industry – Economic reforms in various sectors – nature – challenges – social justice – Sickness in Indian industry, competition Act 2002
UNIT III	**Fiscal Policy**: Nature and significance – public revenues – expenditure- debt, development activities allocation of funds – Critical analysis of the recent fiscal policy of Government of India.
UNIT IV	**India's Trade Policy**: Nature–bilateral and multilateral trade agreements, International business environment: Nature – significance– challenges and mechanisms-Overview of IMF, WTO: Agreements in the Uruguay round including TRIPS, TRIMS and GATS – disputes settlement mechanism – dumping and antidumping measures.
UNIT V	**Legal Frame**: special features of the SICA (special provisions) 1985, BIFR, Consumer protection act 1986, Environmental laws (pertaining to the control and prevention of Air and Water pollution) and the Essential Commodities Act 1955.
UNIT VI	**Disinvestment mechanism:** problems and procedures- new industrial policy 1991- NITI Ayog- Balance of Payments - Nature – Structure – major components – Causes for disequilibrium in Balance of Payments – Correction measures.

References:

1. Aswathappa K:"Essentials of business environment" Himalaya Publishing House, New Delhi,2011

2. Francis Cherunilam"Business Environment: Text&Cases"HPH, 2012
3. Shaikh Saleem: "**Business Environment**", Pearsons, New Delhi,
4. Veena Keshav Pailwar: "**Economic Environment of Business**", PHI Learning, New Delhi, 2012
5. Vivek Mittal: "**Business Environment Text and Cases**", Excel Books New Delhi, 2011.
6. Sundaram and Black: "**International Business Environment Text and Cases**", PHI Private Limited, New Delhi.
7. Avid W Conklin: "**Cases in Environment of Business**", Sage Publication India Private Ltd, New Delhi.
8. Raj Kumar: "**International Business Environment**", Excel Publication, New Delhi, 2012.
9. Palle Krishna Rao: "**WTO-Text and Cases**", Excel Publication, New Delhi.

Course outcomes

1. To understand the overall business environment and evaluate its various components in business decision making.
2. To improve the students ability in recognizing and managing legal risks in business decision making.
3. The course is designed to expose the student to the career fields in the area of business.

HUMANITIES ELECTIVE-I					
Year/Semester	**III B.Tech II Sem**	**L**	**T**	**P**	**C**
Regulation Year	**2019-20**	**2**	**1**	**0**	**3**
Name of the subject	**LIFE SCIENCE FOR ENGINEERS**				
Branch	**ECE, ME, IT, EEE**				

Course Objectives

- Introduce the molecular basis of life.
- Provide the basis for classification of living organisms.
- Describe the transfer of genetic information.
- Introduce the techniques used for modification of living organisms.
- Describe the applications of biomaterials

UNIT I

Comparison of biological organisms with manmade systems, Classification of living organisms, Cellular basis of life, differences between prokaryotes andeukaryotes, classification on the basis of carbon and energy sources ,molecular taxonomy.

Learning Outcomes: After completing this unit, the student will be able to

- summarize the basis of life (L2)
- distinguish prokaryotes from eukaryotes (L4)
- compare biological organisms and manmade systems (L2)
- classify organisms (L2)

UNIT II

Water, Biomolecules: sugars, starch and cellulose, Amino acids and proteins, lipids, Nucleotides and DNA/RNA, structure and functions of proteins and nucleic acids, hemoglobin, antibodies and enzymes, Industrial applications of enzymes, Fermentation and its industrial applications.

Learning Outcomes: After completing this unit, the student will be able to

- outline the importance of water (L2)
- explain the relationship between monomeric units and polymeric units (L2)
- explain the relationship between the structure and function of proteins (L2)
- interpret the relationship between the structure and function of nucleic acids (L2)
- summarize the applications of enzymes in industry (L2)
- explain the applications of fermentation in industry (L2)

UNIT III

Bioenergetics, Respiration: Glycolysis and TCA cycle, Electron transport chain and oxidative phosphorylation, Mechanism of photosynthesis, Human physiology, neurons, synaptic and neuromuscular junctions.

Learning Outcomes: After completing this unit, the student will be able to

- apply thermodynamic principles to biological systems (L3)
- explain the mechanism of respiration and photosynthesis (L2)
- summarize the principles of information transfer and processing in humans (L2)

UNIT IV

Mendel's laws, gene mapping, Mitosis and Meiosis, Epistasis, single gene disorders in humans, Genetic code, DNA replication, Transcription, Translation.

Learning Outcomes: After completing this unit, the student will be able to

- define Mendel's laws (L1)
- demonstrate the mapping of genes (L2)
- explain interactions among genes and their significance (L2)
- differentiate the mitosis and meiosis (L4)
- explain the medical importance of gene disorders (L2)
- IdentifyDNA as a genetic material in the molecular basis of information transfer (L3)

UNIT V

Recombinant DNA Technology: recombinant vaccines, transgenic microbes, plants and animals, animal cloning, biosensors, biochips.

Learning Outcomes: After completing this unit, the student will be able to

- outline the principles of recombinant DNA technology (L2)
- appreciate the potential of recombinant DNA technology (L2)
- summarize the use of biological materials for diagnostic devises (L2)

UNIT VI

Biostatistics covering, Introduction to Biostatistics:-Terms used, types of data; Measures of Central Tendencies- Mean, Median, Mode, Normal and Skewed distributions;
Analysis of Data- Hypothesis testing and ANNOVA (single factor) (4 Lectures)

Text Book(s):

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A global approach", Pearson Education Ltd, 2018.
2. Arthur T Johnson, Biology for Engineers, CRC press, 2011.

Reference Books:

1. Albertset.Al., The molecular biology of the cell, 6/e, Garland Science, 2014.
2. E. E. Conn, P. K. Stumpf, G. Bruening and R. H. Doi, "Outlines of Biochemistry", John Wiley and Sons, 2009.

Course Outcomes

After studying the course, the student will be able to:

- explain catalytic properties of enzymes (L2)
- summarize application of enzymes and fermentation in industry (L2)
- identify DNA as a genetic material in the molecular basis of information transfer (L3)
- apply thermodynamic principles to biological systems. (L3)
- analyze biological processes at the reductionistic level (L4)
- appreciate the potential of recombinant DNA technology (L2)

OPEN ELECTIVE II					
Year/Semester	**III B. Tech- I Sem / III B.Tech – II Sem**	**L**	**T**	**P**	**C**
Regulation Year	**2019-20**	**3**	**0**	**0**	**3**
Subject	**OOP through JAVA**				
Branch	**ECE, ME / EEE, CE**				

Course Objectives:

1. Implementing programs for user interface and application development using core javaprinciples.
2. Focus on object-oriented concepts and java program structure and its installation.
3. Comprehension of java programming constructs, control structuresin Java ProgrammingConstructs.
4. Implementing Object oriented constructs such as various class hierarchies, interfacesand exception handling.
5. Understanding of Thread concepts and I/O inJava.
6. Understanding of Various Components of Java Swing and write Code Snippets using them.

UNIT I:

Introduction to OOP

Introduction, Need of Object-Oriented Programming, Principles of Object-Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program Structures

Variables, Primitive Data types, Identifiers- Naming Conventions, Keywords, Literals, Operators-Binary, Unary and Ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of Control-Branching, Conditional Loops.

UNIT II:

Classes and Objects- Classes, Objects, Creating Objects, Methods, Constructors-Constructor Overloading, Cleaning up Unused Objects-Garbage Collector, Class Variable and Methods, Static Keyword, this keyword.

UNIT III:

Inheritance: Types of Inheritance, Deriving Classes using Extends Keyword, Method Overloading, Super Keyword, Final Keyword, Abstract Class.

Interfaces, Packages: Interface-Extending Interface, Interface Vs Abstract Classes, Packages-Creating Packages, Using Packages, Access Protection, java.lang Package.

UNIT IV:

Exceptions: Introduction, Exception Handling Techniques-try...catch, throw, throws, finally block, User Defined Exception.

Multi-Threading:java.lang.Thread, The main Thread, Creation of New Threads, Thread Priority, Multithreading- Using isAlive() and join(), Synchronization, Suspending and Resuming Threads, Communication between Threads.

Unit V:

Input/Output: File I/O: Reading data from files and writing data to files, accessing data from CSV and Excel files**.**
String Handling: String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Methods for Comparison of Strings, Methods for Modifying Strings, Methods for Searching Strings, Data Conversion and Miscellaneous Methods, Class String Buffer, Class String Builder.

Unit VI:
Event Handling: Event Delegation Model, Sources of Event, Event Listeners, Adapter Classes, Inner Classes.
Swings: Introduction, JFrame, JApplet, JPanel, Components in Swings, Layout Managers, List and JScroll Pane, SplitPane, JTabbedPane, JTree, DialogBox, Pluggable Look and Feel.

Course Outcomes:

1. Able to understand and solve real world problems using OOP techniques.
2. Able to understand the use of abstract classes, Inheritance and Interface.
3. Able to solve problems using java I/o classes.
4. Able to handle textual information using Strings
5. Able to develop multithreaded applications with synchronization.
6. Able to use swings for various applications.

Text Books:
1. The Complete Reference Java, 11th edition, Herbert Schildt,TMH.
2. Programming in JAVA, Sachin Malhotra, SaurabhChoudhary, and Oxford.

References:
1. JAVA Programming, K.Rajkumar,Pearson.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, DreamTech.
3. Core JAVA for Beginners, RashmiKantaDas,Vikas.
4. Object Oriented Programming through JAVA , P Radha Krishna , UniversityPress.
5. Object oriented programming with JAVA, Essentials and Applications, RajKumarBhuyya, Selvi, ChuTMH.
6. Introduction to Java Programming, 7th ed, Y Daniel Liang, Pearson.

OPEN ELECTIVE II					
Course Name	**VLSI DESIGN**				
Year/Semester	**III B.Tech/II Sem EEE**	**L**	**T**	**P**	**C**
Regulation Year	**2019-2020**	**3**	**0**	**0**	**3**

Objectives:

The main objectives of this course are

- Basic characteristics of MOS transistor and examines various possibilities for configuring inverter circuitsand aspects of latch-up are considered.
- Design processes are aided by simple concepts such as stick and symbolic diagrams but the key element is aset of design rules, which are explained clearly.
- Basic circuit concepts are introduced for MOS processes we can set out approximate circuit parameterswhich greatly ease the design process.

Outcomes:

At the end of this course the student can able to

- To learn basic MOS Circuits.
- To learn MOS process technology.
- To learn techniques of chip design using programmable devices.
- To learn the concepts of designing VLSI Subsystems.

Syllabus:

UNIT-I

Introduction and Basic Electrical Properties of MOS Circuits: Introduction to IC technology, Fabricationprocess: nMOS, pMOS and CMOS. Ids versus Vds Relationships, Aspects of MOS transistor Threshold Voltage,MOS transistor Trans, Output Conductance and Figure of Merit. nMOS Inverter, Pull-up to Pull-down Ratio fornMOS inverter driven by another nMOS inverter, and through one or more pass transistors. Alternative forms ofpull-up, The CMOS Inverter, Latch-up in CMOS circuits.

UNIT-II

MOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, Generalobservations on the Design rules, 2μm Double Metal, Double Poly, CMOS rules, 1.2μm Double Metal,Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter.

UNIT-III

Basic Circuit Concepts: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, AreaCapacitance of Layers, Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, InverterDelays, Driving large capacitive loads, Propagation Delays.

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations ofscaling, Limits on logic levels and supply voltage due to noise and currentdensity. Switch logic, Gate logic.

UNIT-IV

Chip Input and Output circuits: ESD Protection, Input Circuits, Output Circuits and L (di/dt) Noise, On-Chipclock Generation and Distribution.
Design for Testability: Fault types and Models, Controllability and Observability, Ad Hoc Testable DesignTechniques, Scan Based Techniques and Built-In Self-Test techniques.

UNIT-V
VlSI Design Issues: VLSI Design issues and design trendsdesign process, design for testability, technology options, power calculations, package selection, clock mechanisms, mixed signal design, ASIC design flow, FPGA design flow, introduction to SoC design.

UNIT-VI
FPGA Design: Basic FPGA architecture, , FPGA configuration,configuration modes, FPGA design process- FPGA design flow, FPGAfamilies, FPGA design examples-stack, queue and shift register implementation using VHDL.

Text Books
1. Essentials of VLSI Circuits and Systems - Kamran Eshraghian, Douglas and A. Pucknell and SholehEshraghian, Prentice-Hall of India Private Limited, 2005 Edition.
2. CMOS Digital Integrated Circuits Analysis and Design- Sung-Mo Kang, Yusuf Leblebici, Tata McGraw-Hill Education, 2003.

References
1. Advanced Digital Design with the Verilog HDL, Michael D.Ciletti, Xilinx Design Series, Pearson Education
2. Analysis and Design of Digital Integrated Circuits in Deep submicron Technology, 3’rd edition, DavidHodges.

OPEN ELECTIVE II					
Course Name	**OPERATIONS RESEARCH**				
Year/Semester	**III B.Tech/II Sem EEE**	**L**	**T**	**P**	**C**
Regulation Year	**2019-2020**	**3**	**0**	**0**	**3**

Course Objectives:

To learn the importance of Operations Research in the design, planning, scheduling, manufacturing and businessapplications and to use the various techniques of Operations Research in solving such problems.

Unit – I: Linear programming problem

Development – definition– characteristics and phases – types of operation research models – applications.

Linear programming problem formulation – graphical solution – simplex method – artificialvariables techniques-big-M method, two–phase method,– duality principle.

Unit – II: Transportation & Assignment Problem:

Formulation – optimal solution, unbalanced transportation problem –degeneracy,

Assignment problem – formulation –Hungarian's algorithm, optimal solution - variants of assignment problem- travelling sales man problem.

Unit – III: Replacement:

Introduction – replacement of items that deteriorate with time – when money value is notcounted and counted – replacement of items that fail completely, group replacement

.

Unit – IV: Theory of Games:

Introduction – mini. max (max. mini) – criterion and optimal strategy – solution ofgames with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2& 2 x n games -graphical method.

Unit-V: Sequencing – Introduction – flow –shop sequencing – n jobs through two machines – n jobs through threemachines – job shop sequencing – two jobs through 'm' machines.

Unit – VI: Queuing Theory

Introduction – single channel – poison arrivals – exponential service times – with infinite population and finite population models– multichannel – poison arrivals – exponential service times with infinite population single channel poison arrivals

Text Books:

1. Operations Research-An Introduction/HamdyATaha/Pearson publishers
2. Operations Research –Theory & publications / S.D.Sharma-Kedarnath/McMillan publishers India Ltd

References:

1. Operations Research /A.M.Natarajan,P.Balasubramani,A. Tamilarasi/Pearson Education.
2. Operations Research / R.Pannerselvam/ PHI Publications.
3. Operations Research / Wagner/ PHI Publications.
4. Operation Research /J.K.Sharma/MacMilan Publ.

Course Outcomes:

After completion of the course, the students will be able to:

1. modal and solve the LP problems
2. solve the transportation and assignment problems
3. make right decisions in operations management using replacement theory
4. make right decisions in operations management using game theory
5. make use sequence models
6. formulate a real time situation in a mathematical model using queuing theory

OPEN ELECTIVE II					
Course Name	**LINEAR INTEGRATED CIRCUIT APPLICATIONS**				
Year/Semester	**III B.Tech/IISem EEE**	**L**	**T**	**P**	**C**
Regulation Year	**2019-2020**	**3**	**0**	**0**	**3**

OBJECTIVES

- To understand the basic operation & performance parameters of differential amplifiers.
- To understand & learn the measuring techniques of performance parameters of OP-AMP
- To learn the linear and non-linear applications of operational amplifiers.
- To understand the analysis & design of different types of active filters using op amps
- To learn the internal structure, operation and applications of different analog ICs
- To Acquire skills required for designing and testing integrated circuits

UNIT I INTEGRATED CIRCUITS: Differential Amplifier-DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input– Balanced/Unbalanced Output, Methods to improve CMRR

UNIT II Characteristics of OP-Amps, Op-amp Block Diagram, ideal and practical Op-amp Specifications, DC and AC characteristics,741 op-amp & its features, Op-Amp parameters & Measurement, Offset voltages & currents, slew rate, CMRR, PSRR, drift, Frequency Compensation techniques.

UNIT III LINEARAPPLICATIONSOFOP-AMPS: Open loop and closed loop configurations, Inverting and Non-inverting amplifiers, Ideal and practical Integrator, Ideal and practical differentiator, Difference amplifier, Instrumentation amplifier, V to I,I to V converters

UNIT IV NON-LINEARAPPLICATIONSOFOP-AMPS: Comparators, Schmitt trigger, Precision Rectifiers, Multivibrators, Log and Antilog Amplifiers, Sample and Hold Circuit, RC Phase shift/Wien bridge Oscillators.

UNIT V ACTIVEFILTERS AND IC 555:

Active Filters: Design & Analysis of Butterworth active filters –1st order,2nd order Low pass, High pass, Band pass, Band reject and all pass filters. IC 555 Timer: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger

UNIT VI

Digital To Analog And Analog To Digital Converters: Introduction, Basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Different types of ADCs –parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.DAC and ADC Specifications.

TEXTBOOKS:

1. Linear Integrated Circuits–D. Roy Choudhury, New Age International (p) Ltd, 2nd Edition, 2003.
2. Op-Amps & Linear ICs- Ramakanth A.Gayakwad, PHI, 1987.
3. Operational Amplifiers–C.G. Clayton, Butterworth & Company Publ. Ltd./Elsevier,1971

REFERENCES:

1. Operational Amplifiers &Linear Integrated Circuits–Sanjay Sharma; SK Kataria & Sons; 2nd Edition,2010
2. Design with Operational Amplifiers & Analog Integrated Circuits–Sergio Franco, Mc Graw Hill, 1988.
3. OP AMPS and Linear Integrated Circuits concepts and Applications, James MFiore, Cenage Learning India Ltd.
4. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, PHI, 6th Edition.
5. Operational Amplifiers & Linear ICs–David A Bell, Oxford Uni.Press,3rd Edition

OUTCOMES

- Design circuits using operational amplifiers for various applications.
- Analyze and design amplifiers and active filters using Op-amp.
- Diagnose and trouble-shoot linear electronic circuits.
- Understand the gain-bandwidth concept and frequency response of the amplifier configurations.
- Understand thoroughly the operational amplifiers with linear integrated circuits.

Year/Semester	III B. Tech/ II Sem	L	T	P	C
Regulation Year	2019-20	0	0	3	1.5
Subject	ELECTRICAL MACHINES – II LAB				
Branch	EEE				

CourseObjectives:

- To learn the speed control methods of three phase induction motor
- To understand the performance characteristics of three phase and single phase induction motors
- To understand the concept of power factor improvementin single phase induction motor
- To understand the various voltage regulation methodsin three phase alternator
- To understand the concept of slip test in synchronous machine by determining Xd and Xq

Any 10 of the following experiments are to be conducted

1. Brake test on three phase induction motor.
2. No-load &blocked rotor tests on three phase induction motor.
3. Regulation of three-phase alternator by synchronous impedance & M.M.F. methods.
4. Regulation of three-phase alternator by Potier triangle method.
5. V and Inverted V curves of three-phase synchronous motor.
6. Determination of Xd and Xq of a salient pole synchronous machine.
7. Equivalent circuit of single phase induction motor.
8. Speed control of induction motor by v/f method.
9. Determination of efficiency of three phase alternator by loading with three phase induction motor.
10. Power factor improvement of single phase induction motor by using capacitors.
11. Brake test on single phase induction motor.
12. Synchronization of three phase alternator with infinite bus bar.

Course Outcomes:

At the end of the lab the student will be able to,

- Control the speed of three phase induction motor
- Determine the performance characteristics of three phase and single phase induction motors
- Improve the power factorin single phase induction motor
- Determine the voltage regulation in three phase alternator
- Determine the Xd and Xq by conducting the slip test

Year/Semester	III B. Tech/ II Sem	L	T	P	C
Regulation Year	2019-20	0	0	3	1.5
Subject	POWER ELECTRONICS LAB				
Branch	EEE				

Course Objectives:

- To study the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR.
- To understand the performance of single–phase and three–phase full–wave bridge converters with both resistive and inductive loads.
- To understand the operation of AC voltage regulator and Cyclo-Converter with resistive and inductive loads.
- To understand the working of Buck converter, Boost converter and inverters.

Any 10 of the following experiments are to be conducted

1. Study the characteristics of SCR, MOSFET & IGBT.
2. Design and development of a firing circuit for SCR.
3. Single -phase half-controlled converter with R and RL load
4. Single -phase fully controlled bridge converter with R and RL loads
5. Single -phase AC Voltage Regulator with R and RL Loads
6. Single -phase Cycloconverter with R Load
7. Single -phase square wave bridge inverter with R and RL Loads
8. Three- phase fully controlled converter with RL–load.
9. verifythe voltages gain of a Boost converter
10. Verify the voltage gain of a Buck converter.
11. Single -phase inverter with Sinusoidal &Trapezoidal PWM technique.
12. Three -phase AC-AC voltage Controller with R-load.

Course Outcomes:

- Able to analyze the characteristics of various power electronic devices and analyze gate drive circuits of IGBT.
- Able to analyze the performance of single–phase and three–phase full–wave bridge converters with both resistive and inductive loads.
- Able to investigate the operation of single-phase AC voltage regulator and Cyclo-converter with resistive and inductive loads.
- Able to investigate the working of buck converter, boost converter, single–phase square wave inverter and PWM inverter.

Course Name	MICRO PROCESSOR AND MICROCONTROLLERS LAB				
Year/Semester	III B.Tech/IISem EEE	L	T	P	C
Regulation Year	2019-2020	0	0	3	1.5

Course Objectives:

- To study programming based on 8086 microprocessor and 8051 microcontrollers.
- To study 8086 microprocessor-based ALP using arithmetic, logical and shift operations.
- To study modular and Dos/Bios programming using 8086 microprocessors.
- To study to interface 8086 with I/O and other devices.
- To study parallel and serial communication using 8051 micro controllers.

List of Experiments:

PART- A: (Minimum of 5 Experiments has to be performed)

8086 Assembly Language Programming and Interfacing

1. Programs for 16 -bit arithmetic operations (using Various AddressingModes).

a. Addition of n-BCDnumbers.

b. Multiplication and Divisionoperations.

2. Program for sorting anarray.
3. Program for Factorial of givenn-numbers.
4. Interfacing ADC to8086
5. Interfacing DAC to8086
6. Interfacing stepper motor to8086

PART-B: (Minimum of 5 Experiments has to be performed)

8051 Assembly Language Programming and Interfacing

1. Finding number of 1's and number of 0's in a given 8-bit number
2. Average ofn-numbers.
3. Program and verify Timer/ Counter in8051.
4. Interfacing Traffic Light Controller to8051.
5. UART operation in8051
6. Interfacing LCD to8051.

Equipment Required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. 8086 Microprocessor kits
4. 8051 microcontroller kits
5. ADC module
6. DAC module
7. Stepper motor module.

Course Outcomes:

CO1: Demonstrate ability to handle arithmetic operations using assembly language programming in TASM and training boards.

CO2: Demonstrate ability to handle logical operations using assembly language programming in TASM.
CO3: Demonstrate ability to handle string instructions using assembly language programming in TASM.
CO4: Demonstrate ability to handle sorting operations and using assembly language programming in TASM.